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Dzyaloshinsky-Moriya interactions in strongly frustrated Kagome and Pyrochlore systems

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The Kagome and Pyrochlore systems exhibit peculiar magnetic properties due to their strongly frustated cristallographic structure, based on edge sharing triangles or tetrahedra. For nearest neighbour antiferromagnetic Heisenberg interactions ($J\, S_i.S_j$), there is no ordering at zero temperature both for quantum and classical spins. We show that, due to the peculiar structure, antisymmetric Dzyaloshinsky-Moriya interactions ($\vec{D}.(S_i \times S_j)$) are present in both lattices. We calculate this interaction for a Kagome system with one t_{2g} electron. For classical spins systems, we study the phase diagram $(T, D/J)$ through Monte-Carlo simulations and show that the structurally induced antisymmetric interaction may drive these systems to ordered states. We also study the quantum case using exact diagonalizations of small clusters.